



LESSON PLAN

BACTERIA AND VIRUSES GRADES 6-8

SUMMARY

Students will investigate the similarities and differences between bacteria and viruses and determine which is living and nonliving.



MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

Science & Engineering Practices	Connections to Classroom Activity
<p>Obtaining, Evaluating, and Communicating Information</p>	<ul style="list-style-type: none"> Students use prior experience and information from the Bacteria and Viruses video to make and support a claim that viruses are nonliving things.
Disciplinary Core Ideas	Connections to Classroom Activity
<p>LS1.A: Structure and Function All living things are made up of cells, which are the smallest units that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular).</p>	<ul style="list-style-type: none"> Students draw on prior experience with viruses to make a claim about viruses – living or nonliving. Students then work together to share their experiences to look for evidence to support their group’s claim. Students revise their claims and supporting evidence after watching the Bacteria and Viruses video.



Cross Cutting Concepts

Connections to Classroom Activity

Scale, Proportion, and Quantity

- Students use their prior experience with viruses and information from the Bacteria and Viruses video to determine viruses (and bacteria) grow in number at exponential rates. They must choose if viruses ability to replicate (and how they replicate) supports their claim about viruses as living organisms or nonliving things.

DURATION

45 minutes

MATERIALS

- Paper
- Pen or pencil



ENGAGE

Engage students in a discussion about their experiences during the COVID-19 pandemic (or other virus outbreak like the flu) to motivate them to figure out whether viruses are living or nonliving.

Ask students to share with a shoulder partner their experiences with the COVID-19 pandemic. Encourage students to focus their discussions on what they know about the coronavirus (or other virus) based on personal experience and/or something they have seen or heard (e.g., watching the news, interacting with social media, having discussions at the dinner table). Ask students to share their idea or their partner's idea with the class. You can use talk moves such as "How do you know that?" or "Tell me more about ..." to facilitate student thinking. Record students' ideas and any questions that arise.

Project [The Virus Debate](#) formative assessment probe and ask students to make a claim about viruses (living or nonliving) and explain their thinking. It is OK at this point in the lesson for students to have misconceptions about viruses.

Tell students that today we'll try to figure out if viruses are living or nonliving.



EXPLORE

Have students separate themselves on opposite sides of the room based on their claim about viruses—one side for "LIVING" and the other side for "NONLIVING." All students must choose a side. Give students 3–5 minutes to share their reasoning with other members of their group about whether viruses are living or nonliving. Each team's objective is to provide the most compelling reasons that a virus is living or nonliving based on what they currently understand to be true. Encourage students to think about things that would be true of ALL viruses. Students might also share ideas about colds and flus (which are also addressed in the Generation Genius video).

Each side of the room must choose their three to five strongest arguments for whether a virus is living or nonliving. Emphasize for students how important their reasoning is to the strength of their argument.

Tell students that revising their thinking based on new information (evidence) is an important part of science. Give students an opportunity to return to their claim about viruses and record new ideas and/or add to their original ideas. Tell students to label their paper or page in their science notebook “BEFORE.”

Return to the student questions you recorded. Ask if any of the questions have been answered. You might also ask which questions they most need to answer to be able to be confident in their claims about viruses (living or nonliving).

Note: In grades K–5, students build understanding that all living things have certain characteristics in common. Middle school students will expand on that to apply their understanding to other organisms as well as the structures and functions cells carry out for living things.



EXPLAIN



WATCH THE GENERATION GENIUS BACTERIA AND VIRUSES VIDEO AS A GROUP

Ask students to record ideas about bacteria and viruses that will help answer the question “Are viruses living or nonliving?” (Including ideas about bacteria which might help students to reason why bacteria are considered living organisms and viruses are not.)

Refer students back to their questions. Ask if they can use the information presented in the video to answer any questions. Also ask students if they have any new questions and add them to the list.



ELABORATE

As students watch the video, ask them to label a new piece of paper or the next page of their science notebook “AFTER.” Ask students to again make a claim about viruses (living or nonliving) and explain their thinking. Encourage them to include ideas about viruses that Dr. Jeff shares in the video. Ask students to circle ideas about viruses that the video confirmed and to draw rectangles around ideas that they did not know before watching the video.

Ask students to turn and talk with a partner and share their claim and thinking about viruses. Give students an opportunity to revise their thinking before bringing the class back together.

Reach consensus as a class on whether viruses are living or nonliving. As students share their ideas, you might use some or all of the questions below to move the class toward consensus:

- Do we all agree with that?
- Is there more evidence needed before we can come to agreement? What is that?
- Where should we go next to help us with areas where we are not in agreement?

Record all evidence (presented as ideas about viruses in the video) to support the claim.



EVALUATE

There are multiple ways to assess your students’ understanding of this topic. The exit ticket is an opportunity for students to use the science ideas they built in the lesson in a new context. Alternatively, you can use the Kahoot! quiz (which provides downloadable scores at the end of the game) and/or the paper quiz. All these resources are located right below the video in the assessment section.



EXTENSION

Obtain a large quantity of a single item (e.g., beans, marshmallows, or even strips of paper). Have students create a mathematical model demonstrating exponential growth of bacteria or viruses, as described in the video.



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